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**A variable torque motor compatible with magnetic resonance imaging.**

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**Public Summary:**

**Scientific Abstract:**

High magnetic fields used in magnetic resonance imaging (MRI) do not allow the employment of conventional motors due to various incompatibility issues. This paper reports on a new motor that can operate in or near high field magnets used for MRI. The motor was designed to be operational with the MRI equipment and could be used in a rotating imaging gantry inside the magnet designed for dual modality imaging. Furthermore, it could also be used for image guided robotic interventional procedures inside a MRI system if so desired. The prototype motor was developed using magnetic resonance (MR) compatible materials, and its functionality with MR imaging was evaluated experimentally by measuring the performance of the motor and its effect on the MR image quality. Since in our application, namely, single photon emission tomography, the motor has to perform precise stepping of the gantry in small angular steps the most important parameter is the start-up torque. The experimental results showed that the motor has a start-up torque up to 1.37 Nm and rotates at 196 rpm when a constant voltage difference of 12 V is applied at a magnetic field strength of 1 T. The MR image quality was quantified by measuring the signal-to-noise of images acquired under different conditions. The results presented here indicate that the motor is MR compatible and could be used for rotating an imaging gantry or a surgical device inside the magnet.

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